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## ORIGINAL ARTICLE

# Surgical treatment of postintubation tracheal stenosis: A retrospective 22-patient series from a single center

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**KEYWORDS**

postintubation;  
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**Summary** *Background/Objective:* We aimed to present cases of postintubation tracheal stenosis (PITS), all due to long-term intubation and treated surgically in a university hospital, and to discuss them in light of the literature.

*Methods:* In this retrospective study, 22 patients who were treated with tracheal resection and reconstruction due to PITS were included. Demographics, intubation characteristics, localization of stenosis, surgical technique and material, postoperative complications, and survival of patients were recorded.

*Results:* The mean intubation duration was 16.95 days with a median of 15.00 days. Collar incision was applied in 19 cases (86.4%); in two cases (9.1%) a median sternotomy incision was used; and in the remaining case (4.5%), a right thoracotomy incision was made. The mean tracheal stenosis length was 2.14 cm (mean excision length, 2.5 cm). In 17 cases (77.3%), the anterior walls were supported with vicryl (polyglactin) suture one by one. No postoperative complications were observed in 12 cases (54.5%). No recurrence developed during the long-term follow-up of 15 of the 22 patients (68.2%). Two patients (9.1%) died in the early stages after surgery, and five patients (22.7%) had a stent inserted due to restenosis.

*Conclusion:* Tracheal resection and end-to-end anastomosis are the most efficient techniques

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in cases without medical contraindications, despite emerging stent or endoscopic procedures. Endoscopic interventions can be suggested as an alternative to surgery in patients for whom surgery cannot be performed or who develop recurrence.

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## 1. Introduction

Postintubation tracheal stenosis (PITS) is a clinical condition that frequently occurs due to tracheostomy or long-term intubation.<sup>1</sup> Although its incidence has decreased due to improvements in intensive care procedures, it continues to be a bothersome problem. The rate of tracheal stenosis related to prolonged intubation varies between 0.6% and 21%.<sup>1,2</sup> PITS occurs due to overinflation of the endotracheal tube or the tracheostomy cuff, causing ischemic necrosis due to the pressure in the trachea.<sup>3</sup> The tracheostomy tube may also cause damage to the cartilage or may cause an infection at the edge of the stoma, and granulation tissue may occur accordingly.<sup>1</sup> Although stenosis is usually seen in the tracheal body, it may also be seen in the subglottic region.<sup>4,5</sup>

The symptoms are generally insidious. Most arise 1–6 weeks after extubation, and early symptoms are often not recognized. The most common symptoms include shortness of breath, cough, recurrent pneumonia, wheezing, stridor, and cyanosis over time.<sup>3</sup> Dyspnea is often the symptom until the tracheal diameter is 50% smaller than normal. When the tracheal diameter is 25% of its normal size, dyspnea and stridor may occur even at rest. These symptoms can be confused with other respiratory diseases.<sup>6</sup>

Despite conservative and palliative interventions,<sup>7</sup> the gold standard treatment for PITS, as described by Grillo, is tracheal resection and primary end-to-end anastomosis with reconstruction.<sup>2</sup> In literature, studies were primarily focused on the management of tracheostomy-induced PITS with limited data on the surgical approaches for PITS due to long-term intubation.<sup>5,8,9</sup> To standardize the surgical techniques and optimize the outcome, more experience on PITS due to long-term intubation needs to be published.

Therefore, in this study, we aimed to present the cases of PITS, all due to long-term intubation and treated surgically in our center, and to discuss them in light of the literature. We evaluated these cases with regard to etiology, diagnosis, treatment, recurrence, and fatality.

## 2. Methods

### 2.1. Setting and patients

The study was conducted at a 1000-bed university hospital with a well-established and experienced (on tracheal surgery) thoracic surgery clinic.

In this retrospective study, all the patients who were treated with tracheal resection and reconstruction due to PITS between September 2006 and March 2015 were

identified consecutively. There was only one inclusion criterion for this study: admission with PITS and treated with tracheal resection and reconstruction (end-to-end anastomosis). Exclusion criteria of the study were (1) tracheal resection due to the traumatic, malignant, or benign disease of the trachea and (2) patients with missing data. The study was approved by the Institutional Ethics Committee and conducted in accordance with the ethical guidelines of the Helsinki Declaration. The informed consent was waived for the retrospective design of the study.

The demographics, intubation characteristics, localization of stenosis, surgical technique and material, postoperative complications, and survival were recorded for all patients.

### 2.2. Preoperative evaluation

All patients were evaluated preoperatively with Hugh–Jones classification, complete routine blood biochemistry, respiratory function test, bilateral chest radiography, lateral neck radiography, and conventional tomography. Patients respiratory performance was varied between Grade 2 and 3 in the Hugh–Jones classification. All patients had fixed upper airway obstruction respiratory function test pattern, which is characterized by flattening of both the inspiratory and expiratory portions of the flow-volume loop. Patients had undergone rigid bronchoscopy and flexible bronchoscopy at least once before the operation, with at least one tracheal dilatation being performed in the operating theater (Figure 1).



Figure 1 Preoperative rigid bronchoscopy image.

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